

IN THE CLAIMS

1. (Original) A method of displaying management information associated with a storage area network, the method comprising:

receiving an identity of a selected managed entity existing in a storage area network;

retrieving a first managed object from a management database that corresponds to the selected managed entity;

identifying a sequence of relationships between the selected managed entity and other managed entities in the storage area network based on information in the first managed object and other corresponding managed objects in the management database; and

graphically displaying a first relationship view of the selected managed entity and at least one other managed entity of the storage area network based on use of columns of icons, a first column including at least one icon graphically representing a managed software entity, a second column including at least one icon graphically representing a managed storage entity, at least a portion of the sequence of relationships being graphically represented by relationship paths between the at least one icon in the first column and the at least one icon in the second column.

2. (Original) A method as in claim 1 further comprising:

extracting information from the first managed object associated with the selected managed entity;

extracting information from other managed objects associated with other managed entities in the storage area network;

storing the information extracted from the first managed object and the other managed objects in corresponding data structures; and

based on processing of information in the data structures, generating a horizontally disposed first relationship view of adjacently positioned columns including the first column of at least one icon, the second column of at least one icons, and corresponding relationship paths from the perspective of an icon representing the selected managed entity.

3. (Original) A method as in claim 1 further comprising:

displaying the first column of at least one icon and the second column of at least one icon on a display screen for a manager of the storage area network;

providing a viewer controlled device supporting movement of a corresponding pointer on the display screen; and

highlighting a relationship path in a vicinity of the pointer on the display screen to emphasize a corresponding relationship between managed entities represented by icons in the first and second columns.

4. (Original) A method as in claim 1 further comprising:

allocating a visual region in relation to a corresponding icon to receive input commands; and

in response to detecting receipt of a generated input command in the visual region by a user, expanding the first relationship view of managed entities in the storage area network into an expanded relationship view including a third column of multiple icons disposed between the first column and the second column, relationship paths being displayed between icons in the first column and the third column and

between icons in the third column and the second column, the icons in the third column representing other previously hidden managed entities associated with the storage area network.

5. (Original) A method as in claim 1 further comprising:
 - utilizing references in the first managed object associated with the selected managed entity to identify the other managed entities related to the selected managed entity.
6. (Original) A method as in claim 1 further comprising:
 - displaying a first container encompassing at least one of the columns and corresponding icons to represent at least one of the following: a database, a file system, a volume, a host server, a storage disk.
7. (Original) A method as in claim 1, wherein graphically displaying the first relationship view includes:
 - displaying a first container encompassing at least one of the columns and corresponding icons; and
 - displaying a second container encompassing at least two of the columns and corresponding icons and the first container.
8. (Original) A method as in claim 1 further comprising:
 - from the first relationship view including at least the first column and second column displayed in a first area of a display screen, detecting a user selection of a particular icon in the first area; and

in response to detecting the user selection of the particular icon in the first area, generating a second relationship view in a second area of the display screen, the second relationship view including a presentation of relationships between a managed entity associated with the particular icon and other associated nearest neighboring managed entities in the storage area network.

9. (Original) A method as in claim 8, wherein the second relationship view is generated in response to a viewer dragging and dropping the particular icon from the first area to the second area of the display screen.

10. (Original) A method as in claim 8 further comprising:

maintaining the display screen to include a third area to display a vertical hierarchy of managed entities associated with the storage area network;

providing selectable input fields in relation to entries in the vertical hierarchy for selection of a managed entity in the storage area network;
and

in response to detecting selection of a particular entry in the vertical hierarchy, generating the first relationship view from the perspective of a corresponding selected managed entity.

11. (Original) A method as in claim 1 further comprising:

maintaining a database of objects identifying relationships between the managed entities via collection of information from agents distributed throughout the storage area network.

12. (Original) A method as in claim 1 further comprising:
 - maintaining a display screen to include an area to display a vertical hierarchy of managed entities associated with the storage area network;
 - providing selectable input fields in relation to entries in the vertical hierarchy for selection of a managed entity in the storage area network;
 - and
 - in response to detecting selection of a particular entry in the vertical hierarchy, generating the first relationship view from the perspective of a corresponding selected managed entity.
13. (Original) A method as in claim 1, wherein the first relationship view identifies a mapping between a file system of a host server and a corresponding storage disk of the storage area network.
14. (Original) A method as in claim 1, wherein the first relationship view includes different types of icons, each type of the different type of icons being represented by a corresponding symbol that identifies a type of managed entity associated with the storage area network.
15. (Original) A method for displaying management information associated with a storage area network, the method comprising:
 - displaying multiple icons representing corresponding managed entities in the storage area network, the multiple icons including at least one software icon associated with a managed software entity and at least one hardware icon associated with a managed hardware entity;
 - displaying the at least one software icon in a first column;

displaying the at least one hardware icon in a second column, the first column being disposed adjacent to the second column;

displaying associations among the managed entities via relationship paths between the icons of the first column and icons of the second column.

16. (Original) A method as in claim 15 further comprising:

in relation to a first icon of the multiple icons, maintaining a visual region associated with the first icon to receive input commands from a user indicating to expand and display hidden attributes associated with a corresponding managed entity associated with the first icon.

17. (Original) A method as in claim 16 further comprising:

in response to detecting an input command signal received in the visual region, displaying an expanded relationship view of managed entities associated with the first icon, the expanded relationship view including: i) additional icons associated with other managed entities in the storage area network, and ii) additional relationship paths between the additional icons and other previously displayed icons.

18. (Original) A method as in claim 17 further comprising:

displaying a graphical container encompassing the first icon and the expanded relationship view of the managed entity associated with the first icon to indicate that the additional icons and corresponding managed entities are related to the first icon and corresponding managed entity.

19. (Original) A method as in claim 15 further comprising:

displaying nested graphical containers encompassing different sets of icons to delineate corresponding functional components associated with a host server of the storage area network.

20. (Original) A method as in claim 15 further comprising:

displaying a first graphical container encompassing icons representing managed entities associated with a host server of the storage area network;

displaying a second graphical container encompassing icons representing managed entities associated with a storage device of the storage area network; and

displaying relationship paths between icons in the first graphical container and icons in the second graphical container to indicate a device mapping between the host server and the storage device.

21. (Original) A method as in claim 15, wherein a first icon of the multiple icons identifies a file system and a second icon of the multiple icons identifies at least part of a storage device, and relationship paths between the first icon and second icon identify a mapping between the file system and storage device.

22. (Original) A computer system for supporting relationship views associated with a storage area network, the computer system comprising:

a processor;

a memory unit that stores instructions associated with an application executed by the processor;

a communication interface that supports communication with other nodes of the storage area network; and

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an interconnect coupling the processor, the memory unit, and the communication interface, enabling the computer system to execute the application and perform operations of:

receiving an identity of a selected managed entity existing in a storage area network;

retrieving a first managed object from a management database that corresponds to the selected managed entity;

identifying a sequence of relationships between the selected managed entity and other managed entities in the storage area network based on information in the first managed object and other corresponding managed objects in the management database; and

graphically displaying a first relationship view of the selected managed entity and at least one other managed entity of the storage area network based on use of columns of icons, a first column including at least one icon graphically representing a managed software entity, a second column including at least one icon graphically representing a managed storage entity, at least a portion of the sequence of relationships being graphically represented by relationship paths between the at least one icon in the first column and the at least one icon in the second column.

23. (Original) A computer system as in claim 22 that additionally performs operations of:

extracting information from the first managed object associated with the selected managed entity;

extracting information from other managed objects associated with other managed entities in the storage area network;

storing the information extracted from the first managed object and the other managed objects in corresponding data structures; and

based on processing of information in the data structures, generating a horizontally disposed first relationship view of adjacently positioned columns including the first column of at least one icon, the second column of at least one icons, and corresponding relationship paths from the perspective of an icon representing the selected managed entity.

24. (Original) A computer system as in claim 22 that additionally performs operations of:

displaying the first column of at least one icon and the second column of at least one icon on a display screen for a manager of the storage area network;

providing a viewer controlled device supporting movement of a corresponding pointer on the display screen; and

highlighting a relationship path in a vicinity of the pointer on the display screen to emphasize a corresponding relationship between managed entities represented by icons in the first and second columns.

25. (Original) A computer system as in claim 22 that additionally performs operations of:

allocating a visual region in relation to a corresponding icon to receive input commands; and

in response to detecting receipt of a generated input command in the visual region by a user, expanding the first relationship view of managed entities in the storage area network into an expanded relationship view including a third column of multiple icons disposed

between the first column and the second column, relationship paths being displayed between icons in the first column and the third column and between icons in the third column and the second column, the icons in the third column representing other previously hidden managed entities associated with the storage area network.

26. (Original) A computer system as in claim 22 that additionally performs operations of:

utilizing references in the first managed object associated with the selected managed entity to identify the other managed entities related to the selected managed entity.

27. (Original) A computer system as in claim 22 that additionally performs operations of:

displaying a first container encompassing at least one of the columns and corresponding icons to represent at least one of the following: a database, a file system, a volume, a host server, a storage disk.

28. (Original) A method as in claim 22, wherein graphically displaying the first relationship view includes:

displaying a first container encompassing at least one of the columns and corresponding icons; and

displaying a second container encompassing at least two of the columns and corresponding icons and the first container.

29. (Original) A computer system as in claim 22 that additionally performs operations of:

from the first relationship view including at least the first column and second column displayed in a first area of a display screen, detecting a user selection of a particular icon in the first area; and

in response to detecting the user selection of the particular icon in the first area, generating a second relationship view in a second area of the display screen, the second relationship view including a presentation of relationships between a managed entity associated with the particular icon and other associated nearest neighboring managed entities in the storage area network.

30. (Original) A computer system as in claim 29, wherein the second relationship view is generated in response to a viewer dragging and dropping the particular icon from the first area to the second area of the display screen.

31. (Original) A computer system as in claim 29 that additionally performs operations of:

maintaining the display screen to include a third area to display a vertical hierarchy of managed entities associated with the storage area network;

providing selectable input fields in relation to entries in the vertical hierarchy for selection of a managed entity in the storage area network; and

in response to detecting selection of a particular entry in the vertical hierarchy, generating the first relationship view from the perspective of a corresponding selected managed entity.

32. (Original) A computer system as in claim 22 that additionally performs operations of:

maintaining a database of objects identifying relationships between the managed entities via collection of information from agents distributed throughout the storage area network.

33. (Original) A computer system as in claim 22 that additionally performs operations of:

maintaining a display screen to include an area to display a vertical hierarchy of managed entities associated with the storage area network;

providing selectable input fields in relation to entries in the vertical hierarchy for selection of a managed entity in the storage area network; and

in response to detecting selection of a particular entry in the vertical hierarchy, generating the first relationship view from the perspective of a corresponding selected managed entity.

34. (Original) A computer system as in claim 22, wherein the first relationship view identifies a mapping between a file system of a host server and a corresponding storage disk of the storage area network.

35. (Original) A computer system as in claim 22, wherein the first relationship view includes different types of icons, each type of the different type of icons being represented by a corresponding symbol that identifies a type of managed entity associated with the storage area network.

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36. (Original) A computer system for displaying relationship views associated with a storage area network, the computer system comprising:
- a processor;
 - a memory unit that stores instructions associated with an application executed by the processor;
 - a communication interface that supports communication with nodes of the storage area network; and
 - an interconnect coupling the processor, the memory unit, and the communication interface, enabling the computer system to execute the application and perform operations of:
 - displaying multiple icons representing corresponding managed entities in the storage area network, the multiple icons including at least one software icon associated with a managed software entity and at least one hardware icon associated with a managed hardware entity;
 - displaying the at least one software icon in a first column;
 - displaying the at least one hardware icon in a second column, the first column being disposed adjacent to the second column;
 - displaying associations among the managed entities via relationship paths between the icons of the first column and icons of the second column.
37. (Original) A computer system as in claim 36 that additionally performs operations of:
- in relation to a first icon of the multiple icons, maintaining a visual region associated with the first icon to receive input commands from a

user indicating to expand and display hidden attributes associated with a corresponding managed entity associated with the first icon.

38. (Original) A computer system as in claim 37 that additionally performs operations of:

in response to detecting an input command signal received in the visual region, displaying an expanded relationship view of managed entities associated with the first icon, the expanded relationship view including: i) additional icons associated with other managed entities in the storage area network, and ii) additional relationship paths between the additional icons and other previously displayed icons.

39. (Original) A computer system as in claim 38 that additionally performs operations of:

displaying a graphical container encompassing the first icon and the expanded relationship view of the managed entity associated with the first icon to indicate that the additional icons and corresponding managed entities are related to the first icon and corresponding managed entity.

40. (Original) A computer system as in claim 36 that additionally performs operations of:

displaying nested graphical containers encompassing different sets of icons to delineate corresponding functional components associated with a host server of the storage area network.

41. (Original) A computer system as in claim 36 that additionally performs operations of:

displaying a first graphical container encompassing icons representing managed entities associated with a host server of the storage area network;

displaying a second graphical container encompassing icons representing managed entities associated with a storage device of the storage area network; and

displaying relationship paths between icons in the first graphical container and icons in the second graphical container to indicate a device mapping between the host server and the storage device.

42. (Original) A computer system as in claim 36, wherein a first icon of the multiple icons identifies a file system and a second icon of the multiple icons identifies at least part of a storage device, and relationship paths between the first icon and second icon identify a mapping between the file system and storage device.
43. (Original) A method of displaying management information associated with a storage area network, the method comprising:
 - receiving an identity of a selected managed entity existing in a storage area network;
 - retrieving a first managed object from a management database that corresponds to the selected managed entity;
 - identifying a sequence of relationships between the selected managed entity and other managed entities in the storage area network based on information in the first managed object and other corresponding managed objects in the management database; and

graphically displaying a first relationship view of the selected managed entity and at least one other managed entity of the storage area network based on use of adjacent columns of icons, a first column including at least one icon graphically representing a managed software entity, a second column including at least two icons graphically representing managed entities, a third column of at least two icons graphically representing managed storage entities, the sequence of relationships being graphically represented by at least some diagonal relationship paths between the at least one icon in the first column, the at least two icons in the second column, and the at least two icons in the third column.

44. (Original) A method as in claim 43 further comprising:

graphically displaying a first container encompassing the first column to identify a host server of the storage area network; and

graphically displaying a second container encompassing at least the third column to identify a storage device.

45. (Original) A computer program product including a computer-readable medium having instructions stored thereon for processing data information, such that the instructions, when carried out by a processing device, enable the processing device to perform the steps of:

receiving an identity of a selected managed entity existing in a storage area network;

retrieving a first managed object from a management database that corresponds to the selected managed entity;

identifying a sequence of relationships between the selected managed entity and other managed entities in the storage area network

based on information in the first managed object and other corresponding managed objects in the management database; and

graphically displaying a first relationship view of the selected managed entity and at least one other managed entity of the storage area network based on use of columns of icons, a first column including at least one icon graphically representing a managed software entity, a second column including at least one icon graphically representing a managed storage entity, at least a portion of the sequence of relationships being graphically represented by relationship paths between the at least one icon in the first column and the at least one icon in the second column.

46. (Original) A computer system for supporting relationship views associated with a storage area network, the computer system including:

means for receiving an identity of a selected managed entity existing in a storage area network;

means for retrieving a first managed object from a management database that corresponds to the selected managed entity;

means for identifying a sequence of relationships between the selected managed entity and other managed entities in the storage area network based on information in the first managed object and other corresponding managed objects in the management database; and

means for graphically displaying a first relationship view of the selected managed entity and at least one other managed entity of the storage area network based on use of columns of icons, a first column including at least one icon graphically representing a managed software entity, a second column including at least one icon graphically representing a managed storage entity, at least a portion of the sequence of relationships being graphically represented by relationship paths

between the at least one icon in the first column and the at least one icon in the second column.

47. (New) A method as in claim 15, wherein displaying the at least one hardware icon in the second column includes displaying multiple hardware icons in the second column; and
- wherein displaying associations includes providing multiple relationship paths between the at least one software icon in the first column and each of the multiple hardware icons in the second column to indicate where data represented by the at least one software icon in the first column is stored in corresponding hardware devices which are represented by the multiple hardware icons in the second column.
48. (New) A method as in claim 47, wherein displaying multiple hardware icons in the second column includes displaying similar types of corresponding symbols in the second column to indicate that the corresponding hardware devices are of the same type.
49. (New) A method as in claim 48 further comprising:
- displaying unique identification information associated with the at least one software icon in the first column; and
- displaying unique identification information associated with each of the multiple hardware icons in the second column.
50. (New) A method as in claim 15, wherein displaying the at least one software icon in the first column includes displaying multiple software managed entities as respective software icons in the first column;
- wherein displaying the at least one hardware icon in the second column includes displaying multiple hardware managed entities as respective hardware icons in the second column; and

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wherein displaying associations includes providing at least two horizontal relationship paths between the respective software icons in the first column and the respective hardware icons in the second column.

51. (New) A method as in claim 50, wherein displaying the associations includes:

displaying a first relationship path of the at least two relationship paths from a first software icon in the first column to a first hardware icon in the second column; and

displaying a second relationship path of the at least two relationship paths from a second software icon in the first column to a second hardware icon in the second column.